

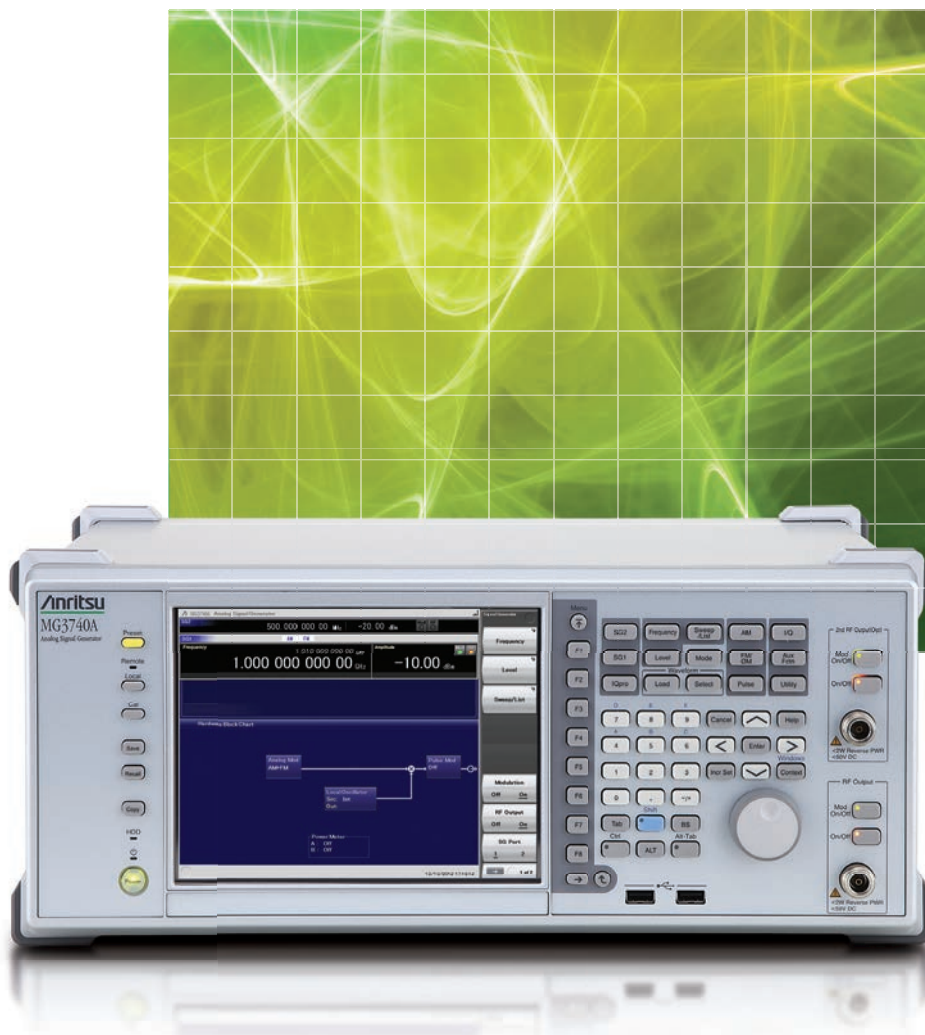
MG3740A

Analog Signal Generator

100 kHz to 2.7 GHz

100 kHz to 4.0 GHz

100 kHz to 6.0 GHz



Contents

Definitions, Conditions of Specifications.....	3
Frequency.....	4
Output Level	5
ATT Hold.....	9
Output Connector	9
Maximum Reverse Input Power	9
Signal Purity	9
Analog Modulation.....	16
Arbitrary Waveform Generator.....	19
Sweep/List Function	21
BER Measurement Function	21
Connector	22
Display.....	23
General.....	23

Definitions

Typical (typ.)

Performance not warranted. Must products meet typical performance.

Nominal (nom.)

Values not warranted. Included to facilitate application of product.

Measured (meas)

Performance not warranted. Data actually measured by randomly selected measuring instruments.

Conditions of Specifications

The conditions are as follows unless specified otherwise.

CW/Modulation Mode

After 30-minute warm-up (at constant ambient temperature)

Pulse Modulation: Off

ATT Hold: Off

Optimize S/N Mode: Off

*: f > 2.7 GHz: Use MG3740A-034/036, MG3740A-064/066

f > 4 GHz: Use MG3740A-036, MG3740A-066

Modulation Mode only

Waveform pattern RMS value: At RMSw (Linear value) and each combination less than following ranges:

$-3.00 \text{ dB} \leq \text{RMSnom} \leq +3.00 \text{ dB}$

$\text{RMSnom} = 20 \cdot \log(\text{RMSw}/4628)$ (16-bit Data)

$\text{RMSnom} = 20 \cdot \log(\text{RMSw}/2314)$ (15-bit Data)

$\text{RMSnom} = 20 \cdot \log(\text{RMSw}/1157)$ (14-bit Data)

after CAL

*: Applies to MG3740A-062/064/066

Frequency

Setting Range

1st SG

9 kHz to 2.7 GHz [MG3740A-032]

9 kHz to 4 GHz [MG3740A-034]

9 kHz to 6 GHz [MG3740A-036]

2nd SG

9 kHz to 2.7 GHz [MG3740A-062]

9 kHz to 4 GHz [MG3740A-064]

9 kHz to 6 GHz [MG3740A-066]

Resolution: 0.01 Hz

Switching Speed

≤600 μs

(Frequency: >187.5 MHz, Phase Noise Optimization: Offset <200 kHz, Time from trigger input to final frequency ±0.1 ppm or within 100 Hz when executing List function.)

Internal Reference Oscillator

without MG3740A-001/002

Aging rate: $\pm 1 \times 10^{-6}$ /year

Temperature characteristics: $\pm 2.5 \times 10^{-6}$ (5° to 45°C)

with MG3740A-001

Start-up characteristics: 23°C, Referenced to frequency at 24 hours after power-on
 $\pm 1 \times 10^{-9}$ (7.5 minutes after power-on)

Aging rate: $\pm 1 \times 10^{-10}$ /month

Temperature characteristics: $\pm 2 \times 10^{-9}$ (5° to 45°C)

with MG3740A-002

Start-up characteristics: 23°C, Referenced to frequency at 24 hours after power-on
 $\pm 5 \times 10^{-7}$ (2 minutes after power-on)
 $\pm 5 \times 10^{-8}$ (5 minutes after power-on)

Aging rate: $\pm 1 \times 10^{-7}$ /year

Temperature characteristics: $\pm 2 \times 10^{-8}$ (5° to 45°C)

Output Level

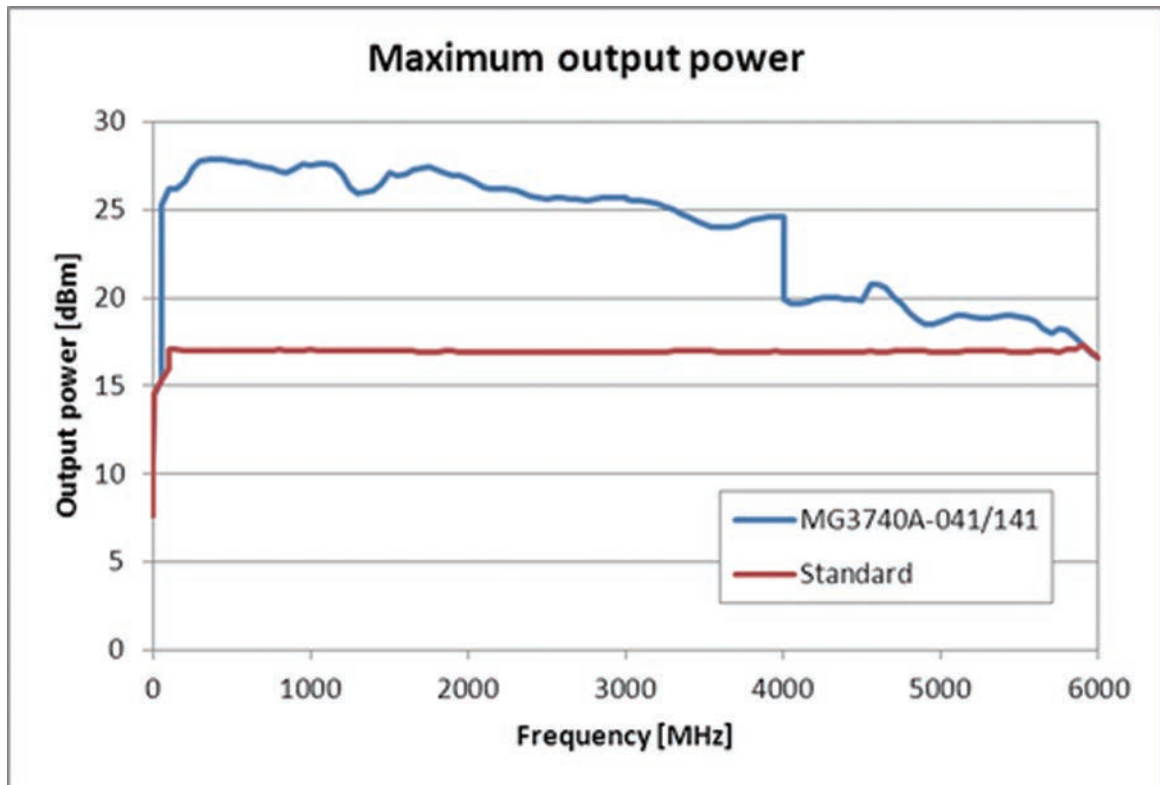
Setting Range

without MG3740A-043/073

- 110 to +17 dBm [without MG3740A-041/042], [without MG3740A-071/072]
- 110 to +30 dBm [with MG3740A-041, without MG3740A-042], [with MG3740A-071, without MG3740A-072]
- 144 to +17 dBm [without MG3740A-041, with MG3740A-042], [without MG3740A-071, with MG3740A-072]
- 144 to +30 dBm [with MG3740A-041/042], [with MG3740A-071/072]

with MG3740A-043/073

- 110 to +17 dBm [without MG3740A-041/042], [without MG3740A-071/072]
- 110 to +25 dBm [with MG3740A-041, without MG3740A-042], [with MG3740A-071, without MG3740A-072]
- 144 to +17 dBm [without MG3740A-041, with MG3740A-042], [without MG3740A-071, with MG3740A-072]
- 144 to +25 dBm [with MG3740A-041/042], [with MG3740A-071/072]



(meas)

Unit

dBm, dB μ V (Terminated, Open)

Resolution

0.01 dB

Switching Speed

$\leq 600 \mu\text{s}$

(When frequency is > 187.5 MHz within output level accuracy specification range)

However, the output level is $\leq +7$ dBm when neither the MG3740A-041 nor MG3740A-071 is installed.

This is defined as the period from detection of the List function execution trigger until the time when the frequency is within ± 0.2 dB of the final output level.

Level Accuracy

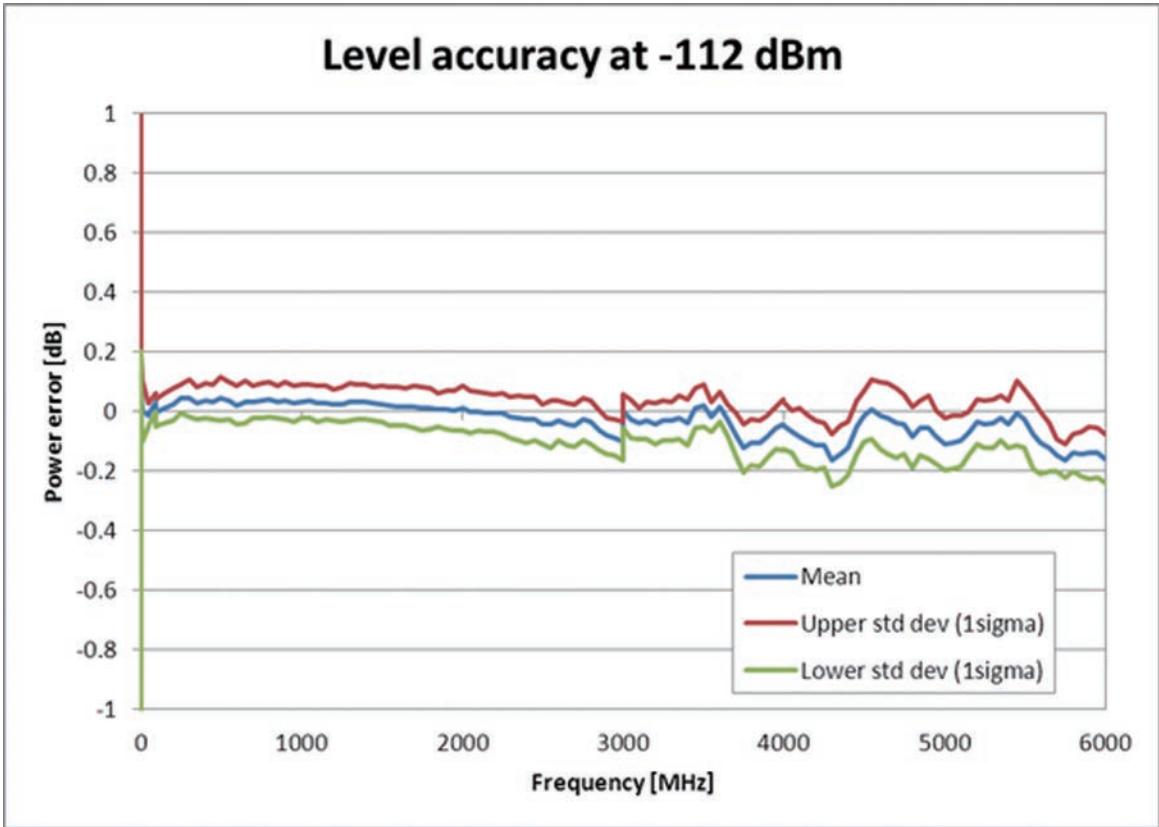
18° to 28°C, CW

without Reverse Power Protection [without MG3740A-043], [without MG3740A-073]

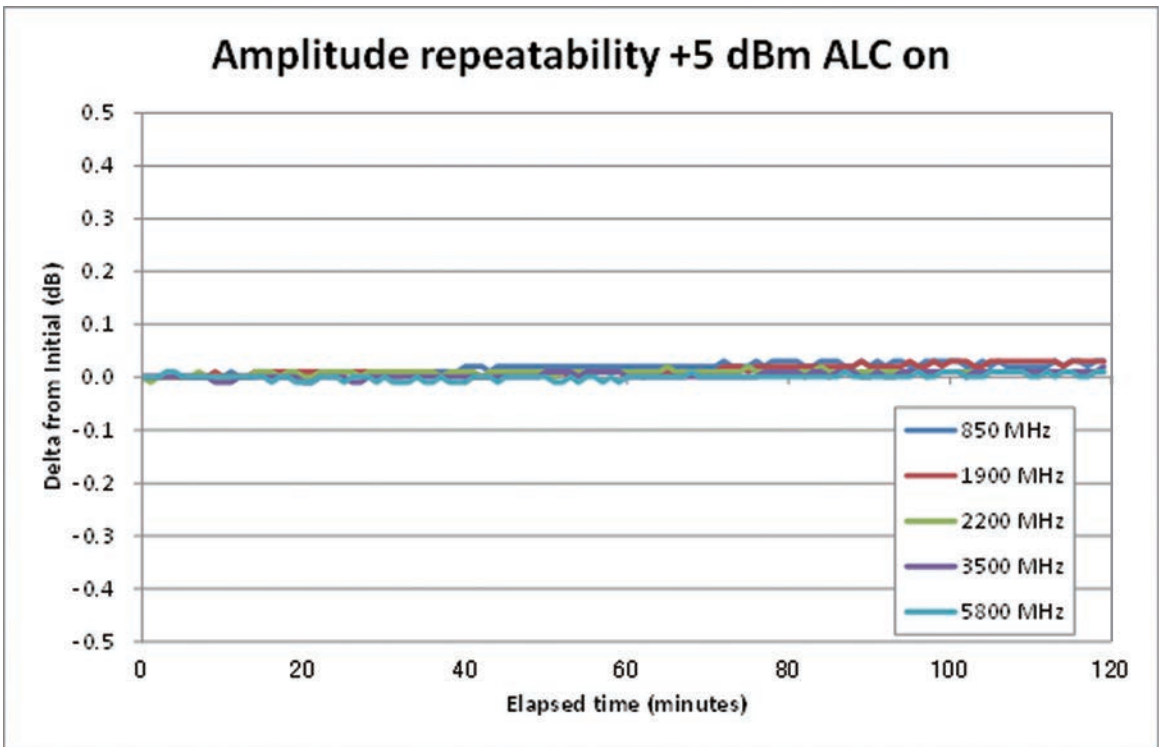
Frequency range	Low Power Extension MG3740A-042/072		High Power Extension MG3740A-041/071		≤+23 dBm >+20 dBm	≤+20 dBm >+13 dBm	≤+13 dBm >+11 dBm	≤+11 dBm >+10 dBm	≤+10 dBm >+5 dBm	≤+5 dBm >-100 dBm	≤-100 dBm >-110 dBm	≤-110 dBm >-120 dBm	≤-120 dBm >-127 dBm	≤-127 dBm >-136 dBm	
	without	with	without	with											
100 kHz ≤ f < 1 MHz	without	without	—	—	—	—	—	—	—	±0.5 dB (typ.)	—	—	—	—	
	without	with	—	—	—	—	—	—	—		—	—	—	—	—
	with	with	—	—	—	—	—	—	—		—	—	—	—	—
1 MHz ≤ f < 10 MHz	without	without	—	—	—	—	—	—	—	±0.5 dB (typ.)	—	—	—	—	
	without	with	—	—	—	—	—	—	—		±0.5 dB (typ.)	—	—	—	—
	with	with	—	—	—	—	—	—	—		—	—	—	—	—
10 MHz ≤ f < 50 MHz	without	without	—	—	—	—	—	—	±0.7 dB (typ.)	±0.5 dB (typ.)	—	—	—	—	
	without	with	—	—	—	—	—	±0.5 dB (typ.)			—	—	—	—	—
	with	with	—	—	—	—	—	—			—	—	—	—	—
50 MHz ≤ f < 400 MHz	without	without	—	—	—	—	—	—	±0.5 dB	—	—	—	—	—	
	without	with	—	±0.6 dB	—	—	—	—		±0.5 dB	±0.7 dB	±1.5 dB (typ.)	—	—	
	with	with	—	±0.6 dB	—	—	—	—		—	—	—	—	—	
400 MHz ≤ f ≤ 3 GHz	without	without	—	±0.6 dB	—	—	—	—	±0.5 dB	—	—	—	—	—	
	without	with	—	±0.6 dB	—	—	—	—		±0.5 dB	±0.7 dB	±1.5 dB (typ.)	—	—	
	with	with	—	±0.6 dB	—	—	—	—		—	—	—	—	—	
3 GHz < f ≤ 4 GHz	without	without	—	±0.7 dB	—	—	—	—	±0.7 dB	—	—	—	—	—	
	without	with	—	±0.7 dB	—	—	—	—		±0.7 dB	±2.5 dB (typ.)	—	—	—	
	with	with	—	±0.7 dB	—	—	—	—		—	—	—	—	—	
4 GHz < f ≤ 5 GHz	without	without	—	—	—	—	—	—	±0.8 dB	—	—	—	—	—	
	without	with	—	—	—	—	—	—		±1.0 dB	±2.5 dB (typ.)	—	—	—	
	with	with	—	—	—	—	—	—		—	—	—	—	—	
5 GHz < f ≤ 6 GHz	without	without	—	—	—	—	—	—	±0.8 dB	—	—	—	—	—	
	without	with	—	—	—	—	—	—		±1.0 dB	±2.5 dB (typ.)	—	—	—	
	with	with	—	—	—	—	—	—		—	—	—	—	—	

with Reverse Power Protection [with MG3740A-043], [with MG3740A-073]

Frequency range	Low Power Extension MG3740A-042/072		High Power Extension MG3740A-041/071		≤+20 dBm >+17 dBm	≤+17 dBm >+10 dBm	≤+10 dBm >+8 dBm	≤+8 dBm >+7 dBm	≤+7 dBm >+2 dBm	≤+2 dBm >-2 dBm	≤-2 dBm >-100 dBm	≤-100 dBm >-110 dBm	≤-110 dBm >-120 dBm	≤-120 dBm >-127 dBm	≤-127 dBm >-136 dBm
	without	with	without	with											
100 kHz ≤ f < 1 MHz	without	without	—	—	—	—	—	—	±0.5 dB (typ.)	—	—	—	—	—	—
	without	with	—	—	—	—	—	—		—	—	—	—	—	—
	with	with	—	—	—	—	—	—		—	—	—	—	—	—
1 MHz ≤ f < 10 MHz	without	without	—	—	—	—	—	—	±0.5 dB (typ.)	—	—	—	—	—	—
	without	with	—	—	—	—	—	—		±0.5 dB (typ.)	—	—	—	—	—
	with	with	—	—	—	—	—	—		—	—	—	—	—	—
10 MHz ≤ f < 50 MHz	without	without	—	—	—	—	—	±0.7 dB (typ.)	±0.5 dB (typ.)	—	—	—	—	—	
	without	with	—	—	—	—	—			±0.5 dB (typ.)	—	—	—	—	—
	with	with	—	—	—	—	—			—	—	—	—	—	—
50 MHz ≤ f < 400 MHz	without	without	—	—	—	—	—	±0.6 dB	±0.5 dB	—	—	—	—	—	
	without	with	—	±0.6 dB	—	—	—			±0.5 dB	±0.7 dB	±1.5 dB (typ.)	—	—	
	with	with	—	±0.6 dB	—	—	—			—	—	—	—	—	
400 MHz ≤ f ≤ 3 GHz	without	without	—	±0.6 dB	—	—	—	±0.5 dB	—	—	—	—	—	—	
	without	with	—	±0.6 dB	—	—	—		±0.7 dB	±1.0 dB	±1.5 dB (typ.)	—	—		
	with	with	—	±0.6 dB	—	—	—		—	—	—	—	—		
3 GHz < f ≤ 4 GHz	without	without	—	±0.7 dB	—	—	—	±0.7 dB	±0.8 dB	—	—	—	—	—	
	without	with	—	±0.7 dB	—	—	—			±1.0 dB	±2.5 dB (typ.)	—	—	—	
	with	with	—	±0.7 dB	—	—	—			—	—	—	—	—	
4 GHz < f ≤ 5 GHz	without	without	—	—	—	—	—	±0.8 dB	—	—	—	—	—	—	
	without	with	—	—	—	—	—		±1.0 dB	±2.5 dB (typ.)	—	—	—		
	with	with	—	—	—	—	—		—	—	—	—	—		
5 GHz < f ≤ 6 GHz	without	without	—	—	—	—	—	±0.8 dB	—	—	—	—	—	—	
	without	with	—	—	—	—	—		±1.0 dB	±2.5 dB (typ.)	—	—	—		
	with	with	—	—	—	—	—		—	—	—	—	—		



(meas)



(meas)

Level Linearity

18° to 28°C, CW

without Reverse Power Protection [without MG3740A-043], [without MG3740A-073]

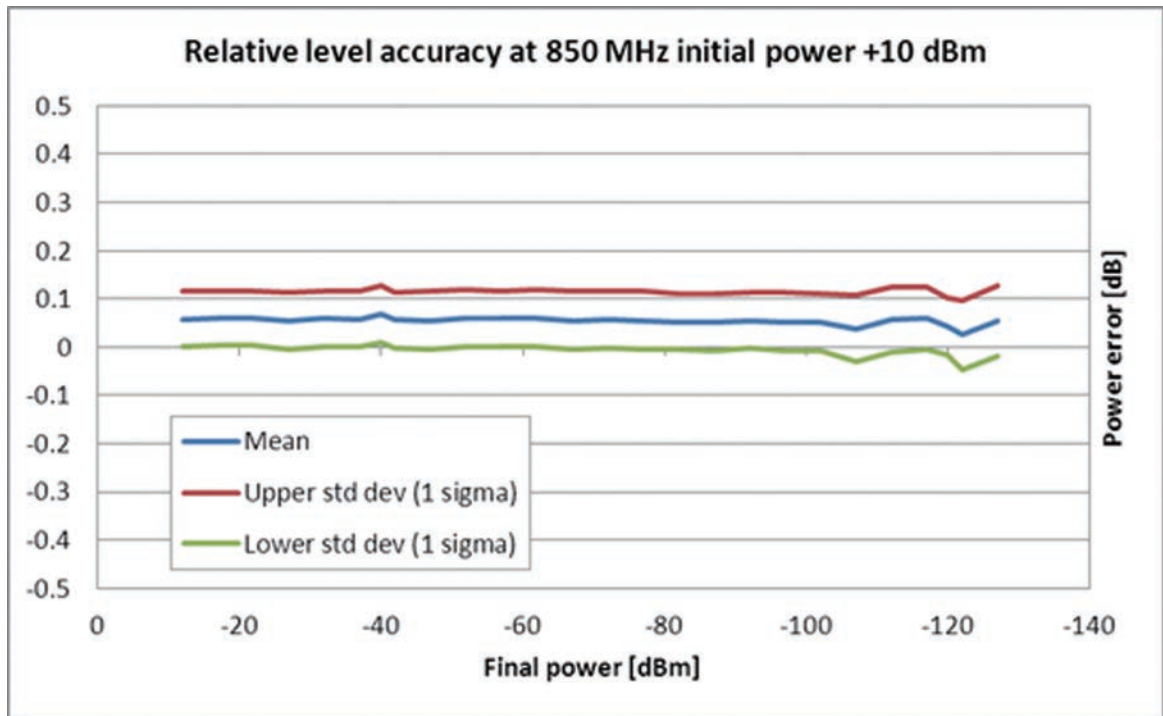
Referenced to level: -7 dBm

Frequency range	Low Power Extension MG3740A-042/072	High Power Extension MG3740A-041/071	<+1 dBm >-110 dBm	≤-110 dBm >-120 dBm
50 MHz ≤ f < 400 MHz	without	without/with	±0.2 dB (typ.)	—
	with			±0.2 dB (typ.)
400 MHz ≤ f ≤ 3 GHz	without		±0.2 dB (typ.)	±0.2 dB (typ.)
	with		±0.2 dB (typ.)	±0.2 dB (typ.)
3 GHz < f ≤ 4 GHz	without		±0.3 dB (typ.)	±0.3 dB (typ.)
	with		±0.3 dB (typ.)	±0.3 dB (typ.)
4 GHz < f ≤ 6 GHz	without	±0.3 dB (typ.)	±0.3 dB (typ.)	
	with	±0.3 dB (typ.)	—	

with Reverse Power Protection [with MG3740A-043], [with MG3740A-073]

Referenced to level: -10 dBm

Frequency range	Low Power Extension MG3740A-042/072	High Power Extension MG3740A-041/071	<-2 dBm >-100 dBm	≤-100 dBm >-110 dBm
50 MHz ≤ f < 400 MHz	without/with	without/with	±0.2 dB (typ.)	
400 MHz ≤ f ≤ 3 GHz			±0.2 dB (typ.)	
3 GHz < f ≤ 4 GHz			±0.3 dB (typ.)	±0.4 dB (typ.)
4 GHz < f ≤ 6 GHz			±0.3 dB (typ.)	±0.4 dB (typ.)



(meas)

ATT Hold Function

When ATT Hold is set to ON, level adjustment is supported for continuous signal generation.

Setting Range: -10 to +10 dB (However, each upper and lower limit of the adjustment range is restricted by the signal output range.)

Resolution: 0.01 dB

Output Connector

Connector

N-J Connector, 50Ω (Front panel)

VSWR

without MG3740A-043

(Output Level: ≤-7 dBm)

≤1.45 (50 MHz ≤ f ≤ 3 GHz)

≤1.65 (3 GHz < f ≤ 4 GHz)

≤1.9 (4 GHz < f ≤ 6 GHz)

with MG3740A-043

(Output Level: ≤-10 dBm)

≤1.45 (50 MHz ≤ f ≤ 3 GHz)

≤1.65 (3 GHz < f ≤ 4 GHz)

≤1.9 (4 GHz < f ≤ 6 GHz)

without MG3740A-073

(Output Level: ≤-7 dBm)

≤1.45 (50 MHz ≤ f ≤ 3 GHz)

≤1.65 (3 GHz < f ≤ 4 GHz)

≤1.9 (4 GHz < f ≤ 6 GHz)

with MG3740A-073

(Output Level: ≤-10 dBm)

≤1.45 (50 MHz ≤ f ≤ 3 GHz)

≤1.65 (3 GHz < f ≤ 4 GHz)

≤1.9 (4 GHz < f ≤ 6 GHz)

Maximum Reverse Input Power

±50 VDC (max.)

without MG3740A-043

2 W (nom.)

with MG3740A-043

20 W (1 MHz < Frequency of Reverse Input Power ≤ 2 GHz) (nom.)

10 W (2 GHz < Frequency of Reverse Input Power ≤ 6 GHz) (nom.)

without MG3740A-073

2 W (nom.)

with MG3740A-073

20 W (1 MHz < Frequency of Reverse Input Power ≤ 2 GHz) (nom.)

10 W (2 GHz < Frequency of Reverse Input Power ≤ 6 GHz) (nom.)

Signal Purity

Harmonic Spurious

(CW, Optimize S/N: Off)

without MG3740A-043, or MG3740A-073

without MG3740A-041

<-30 dBc (Output Level: ≤+4 dBm, 10 MHz ≤ f ≤ 3 GHz)

<-30 dBc (Output Level: ≤+4 dBm, f >3 GHz)

with MG3740A-041

<-30 dBc (Output Level: ≤+4 dBm, 10 MHz ≤ f < 50 MHz)

<-30 dBc (Output Level: ≤+12 dBm, 50 MHz ≤ f ≤ 3 GHz)

<-30 dBc (Output Level: ≤+4 dBm, f >3 GHz)

with MG3740A-043, or MG3740A-073

without MG3740A-041

<-30 dBc (Output Level: ≤+1 dBm, 10 MHz ≤ f ≤ 3 GHz)

<-30 dBc (Output Level: ≤+1 dBm, f >3 GHz)

with MG3740A-041

<-30 dBc (Output Level: ≤+1 dBm, 10 MHz ≤ f < 50 MHz)

<-30 dBc (Output Level: ≤+9 dBm, 50 MHz ≤ f ≤ 3 GHz)

<-30 dBc (Output Level: ≤+1 dBm, f >3 GHz)

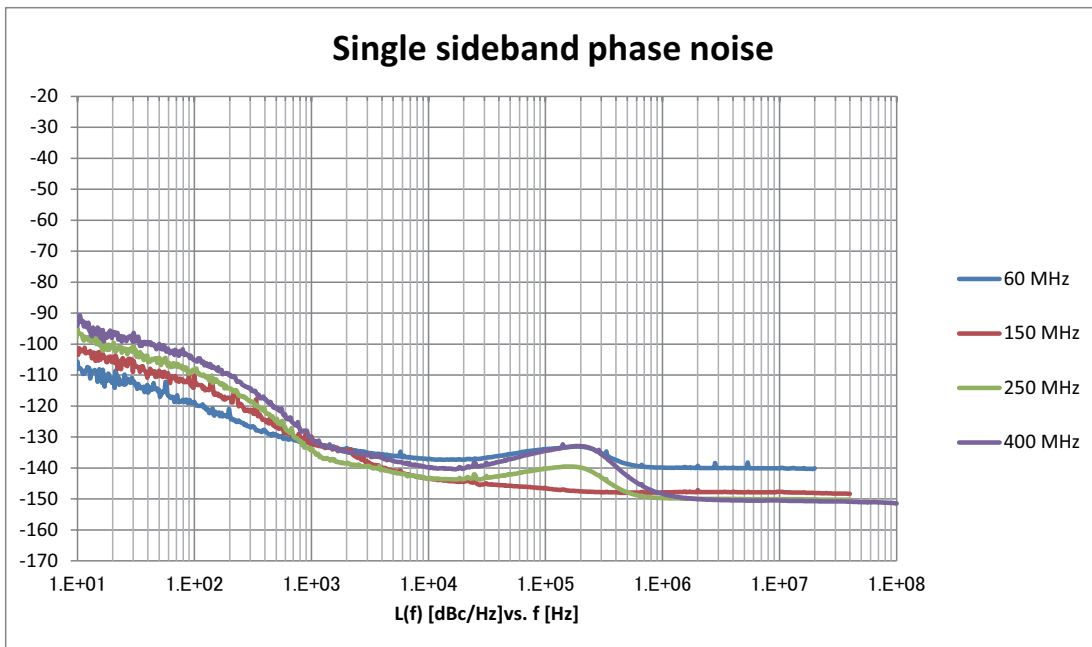
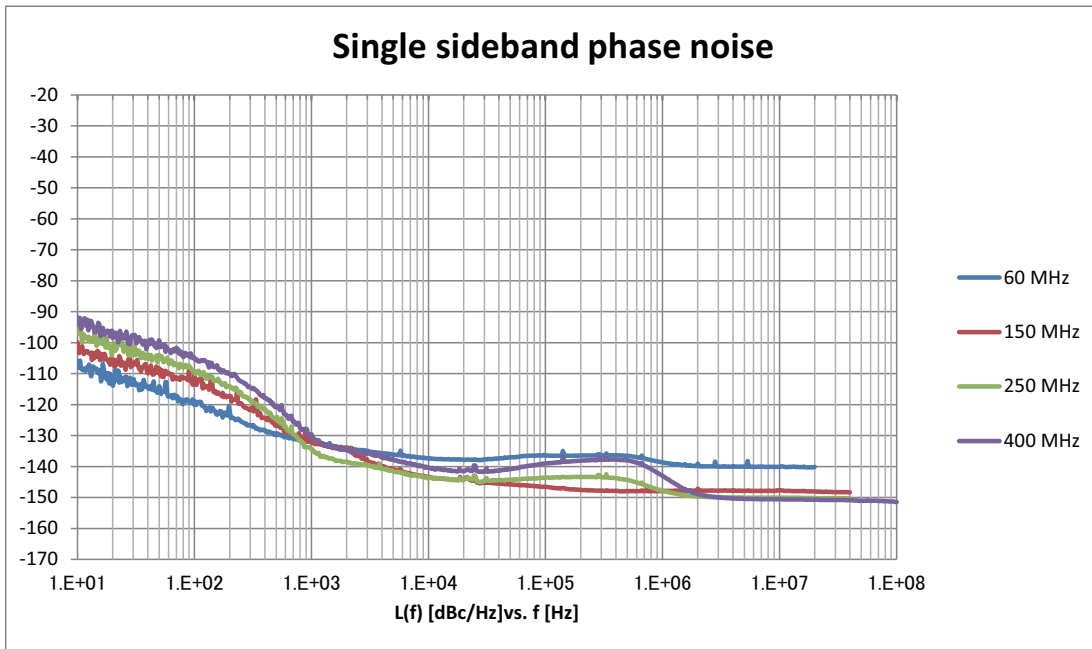
Non-harmonic Spurious

- (CW, $-30 \text{ dBm} \leq \text{Output Level} \leq +5 \text{ dBm}$, Offset: $\geq 10 \text{ kHz}$)
 - $< -62 \text{ dBc}$, -70 dBc (typ.) ($100 \text{ kHz} \leq f \leq 187.5 \text{ MHz}$)
 - $< -68 \text{ dBc}$, -76 dBc (typ.) ($187.5 \text{ MHz} < f \leq 750 \text{ MHz}$)
 - $< -62 \text{ dBc}$, -76 dBc (typ.) ($750 \text{ MHz} < f \leq 1.5 \text{ GHz}$)
 - $< -56 \text{ dBc}$, -70 dBc (typ.) ($1.5 \text{ GHz} < f \leq 3 \text{ GHz}$)
 - $< -50 \text{ dBc}$, -64 dBc (typ.) ($3 \text{ GHz} < f \leq 6 \text{ GHz}$)

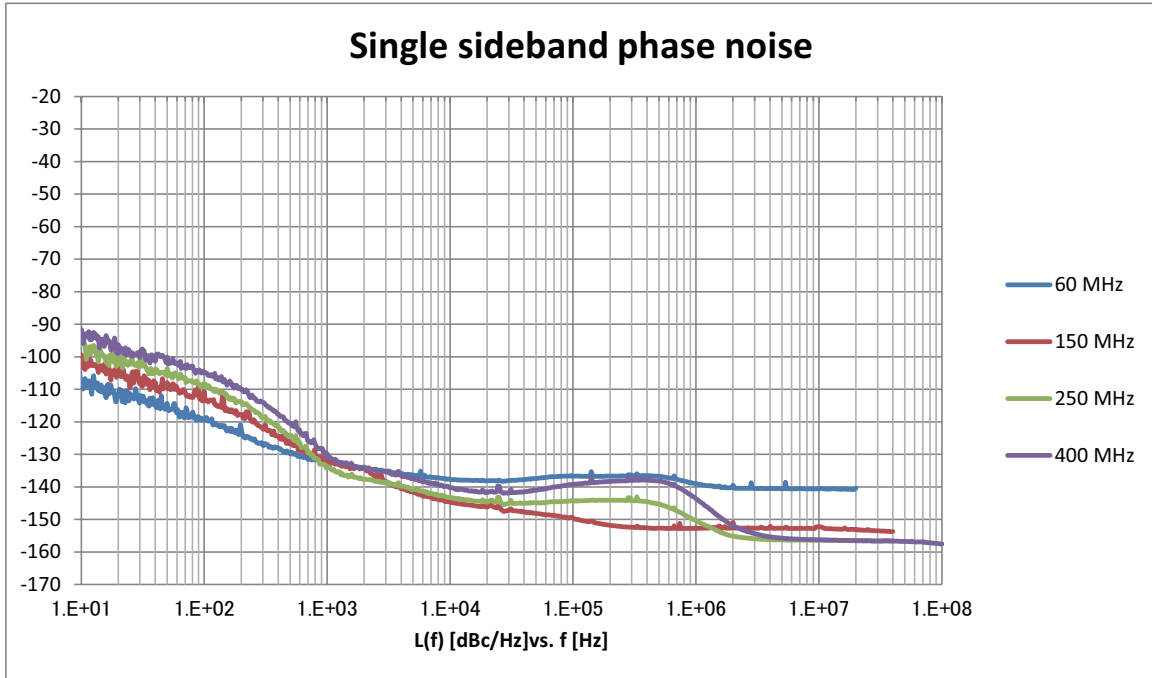
SSB Phase Noise

- (CW, Phase Noise Optimization: $< 200 \text{ kHz}$, Offset: 20 kHz)
 - $< -140 \text{ dBc/Hz}$ (nom.) (100 MHz)
 - $< -131 \text{ dBc/Hz}$ (typ.) (1 GHz)
 - $< -125 \text{ dBc/Hz}$ (typ.) (2 GHz)

- 60/150/260/400 MHz, CW, Optimize S/N: Off, with MG3740A-002

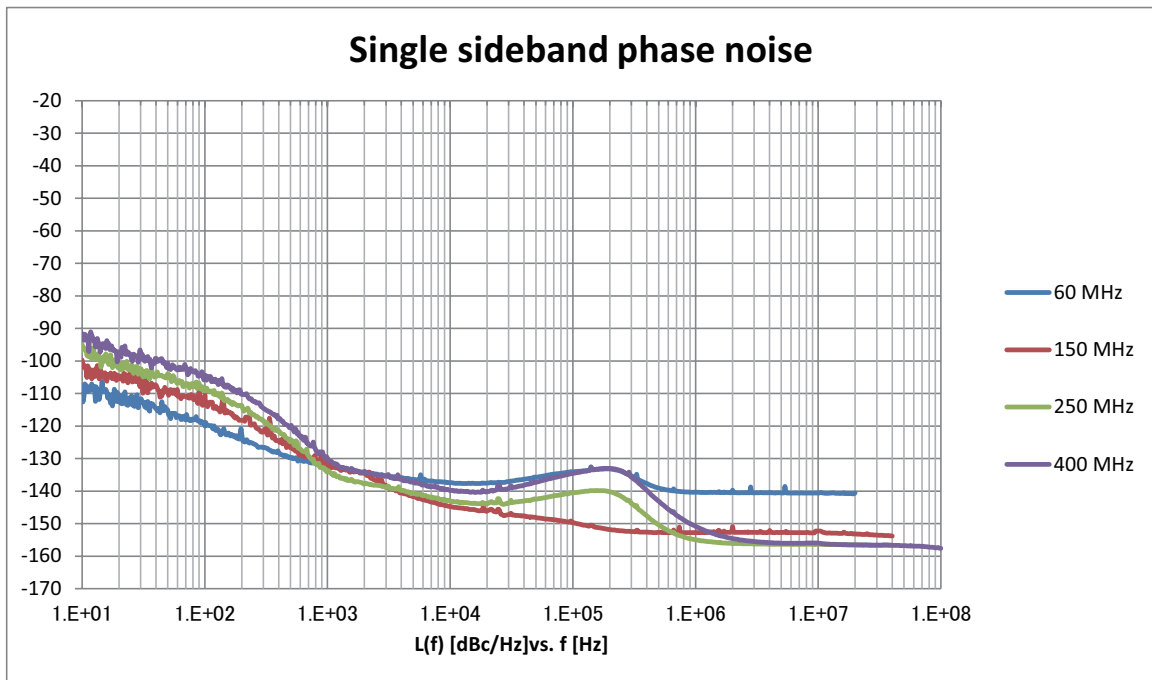


■ 60/150/260/400 MHz, CW, Optimize S/N: On, with MG3740A-002



Phase Noise Optimization: <math><200</math> kHz

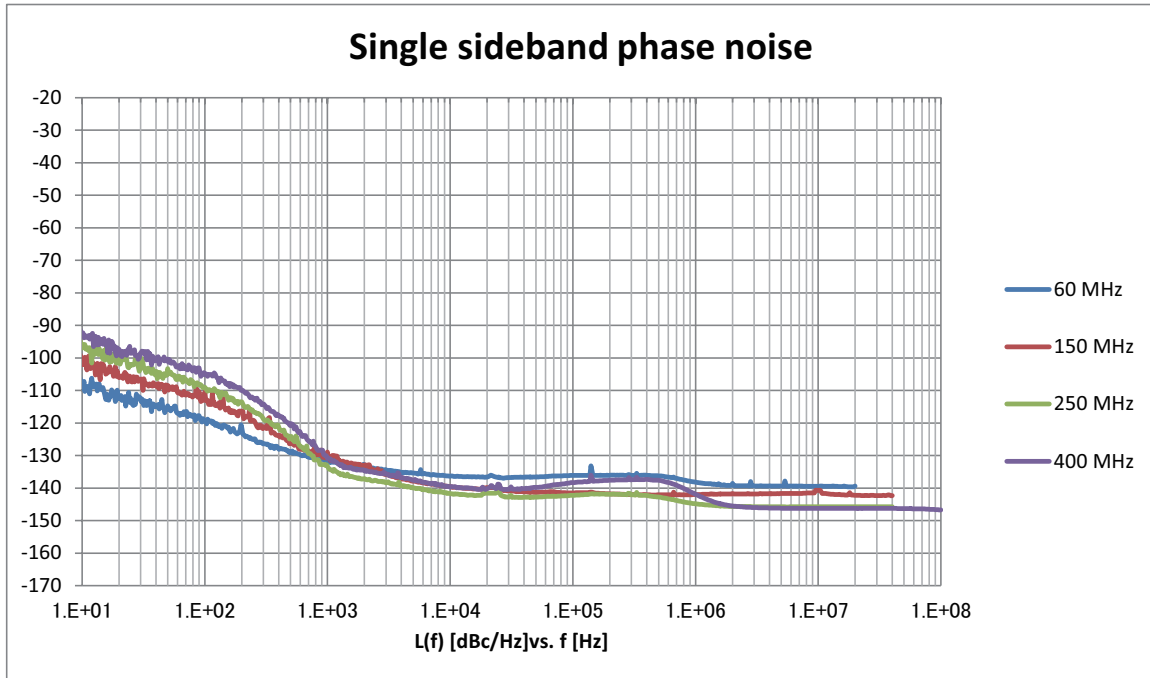
(meas)



Phase Noise Optimization: >300 kHz

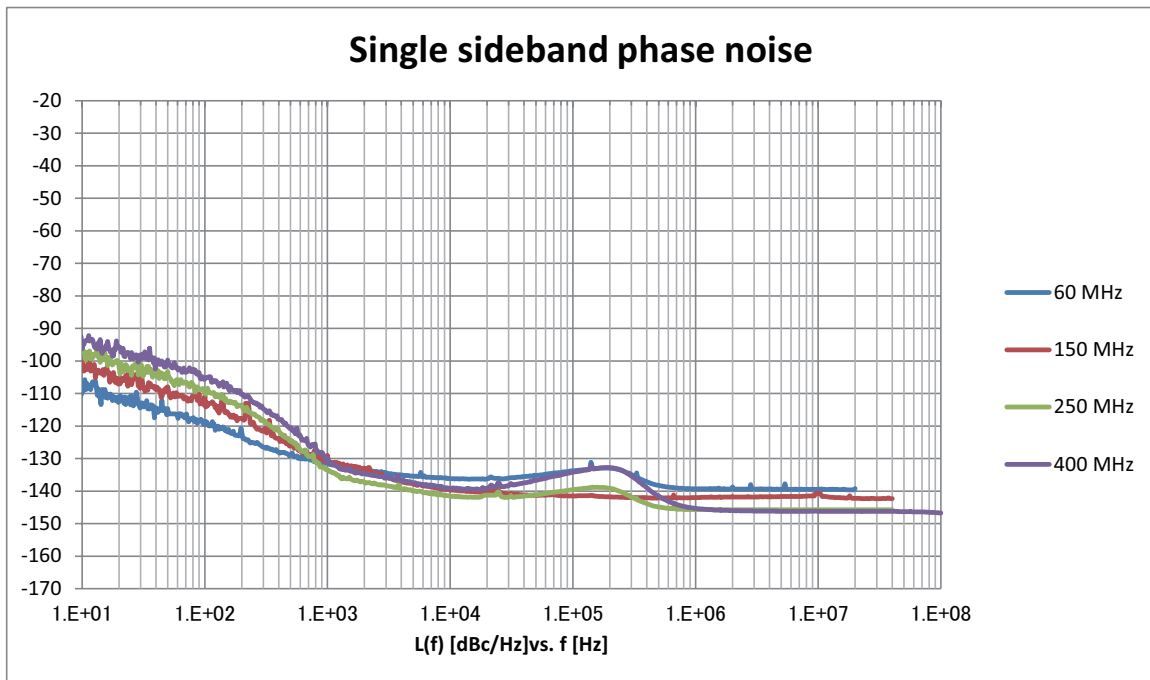
(meas)

■ 60/150/260/400 MHz, Mod = On, with MG3740A-002



Phase Noise Optimization: <math><200</math> kHz

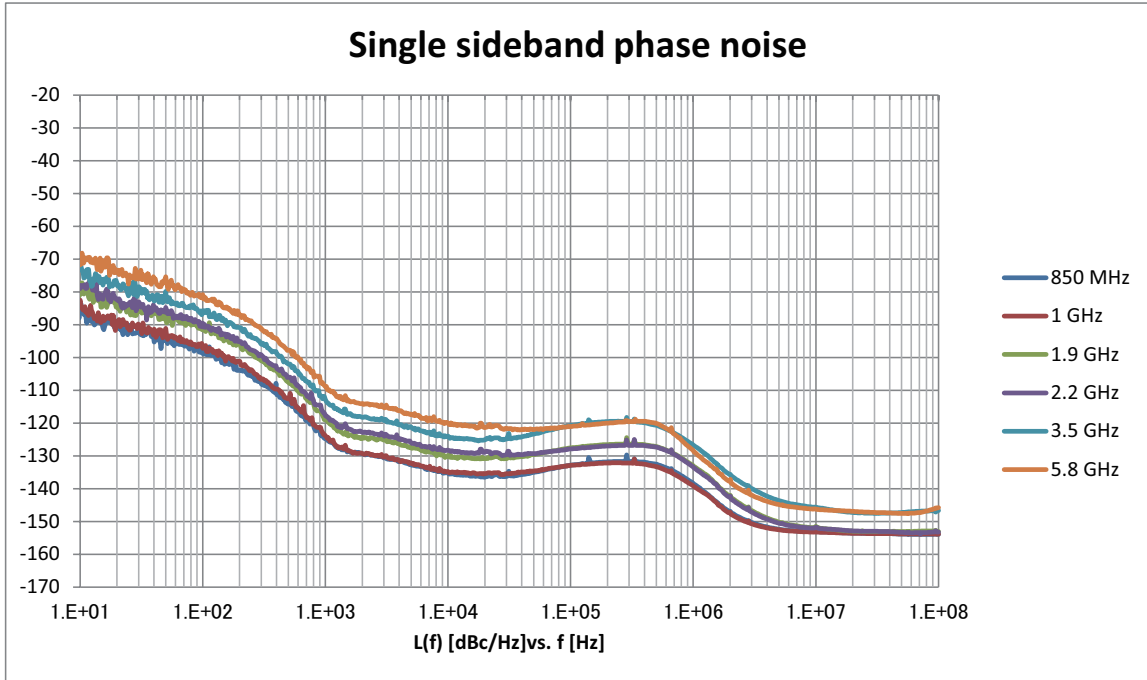
(meas)



Phase Noise Optimization: >300 kHz

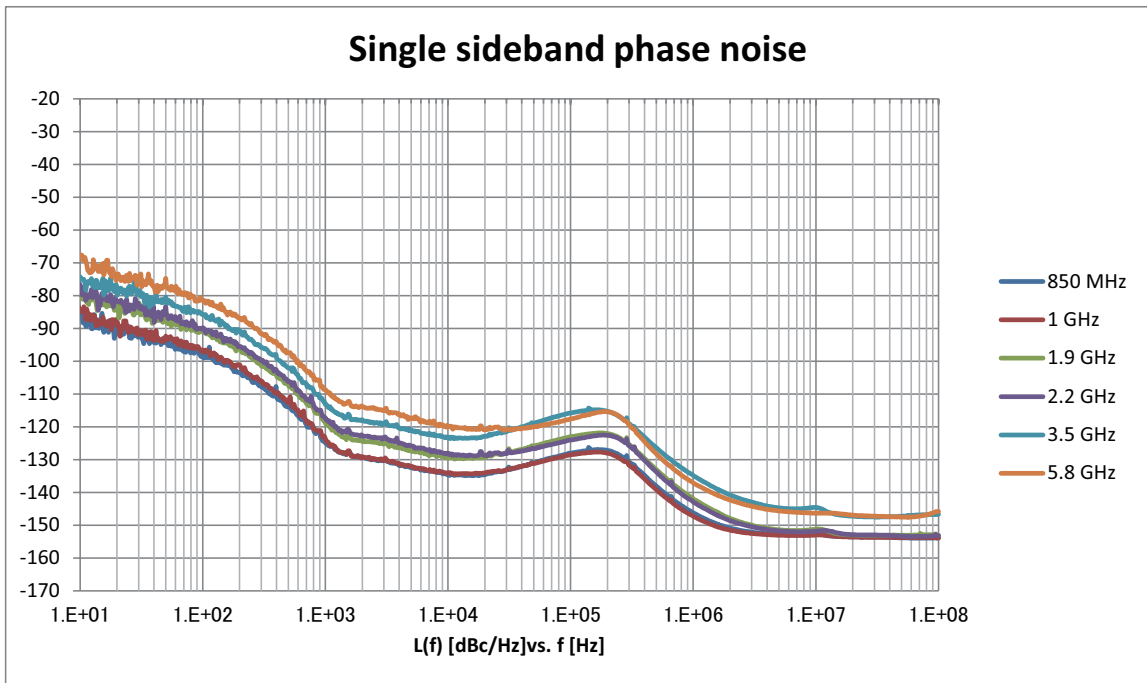
(meas)

■ 850 MHz, 1/1.9/2.2/3.5/5.8 GHz, CW, Optimize S/N: Off, with MG3740A-002



Phase Noise Optimization: <200 kHz

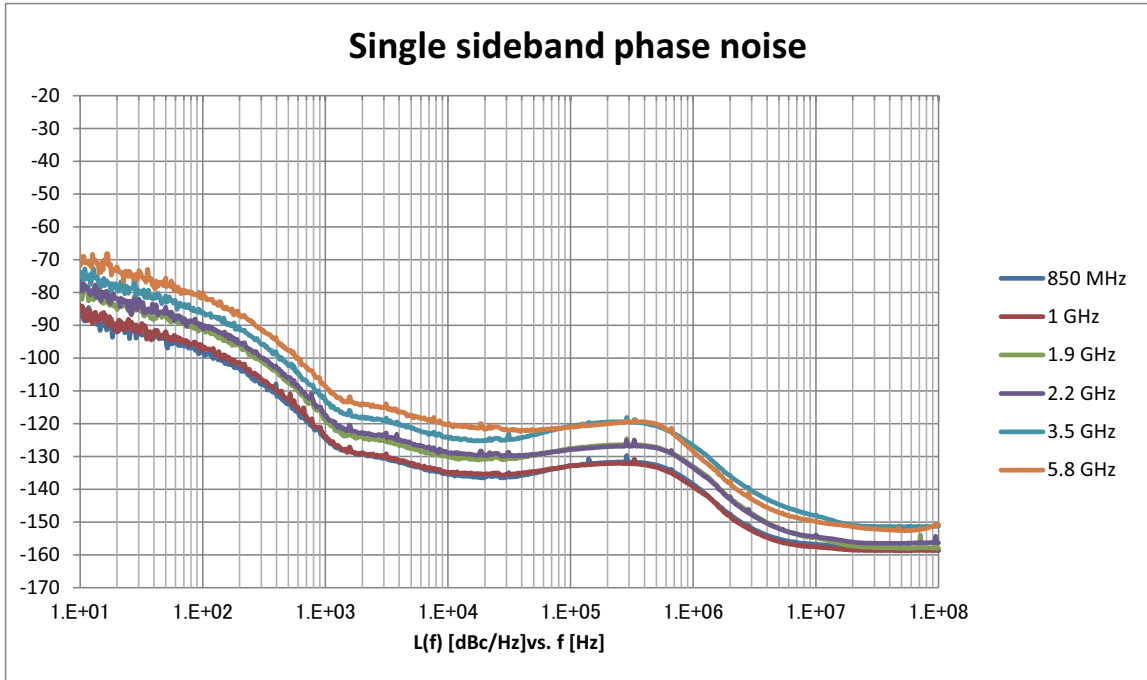
(meas)



Phase Noise Optimization: >300 kHz

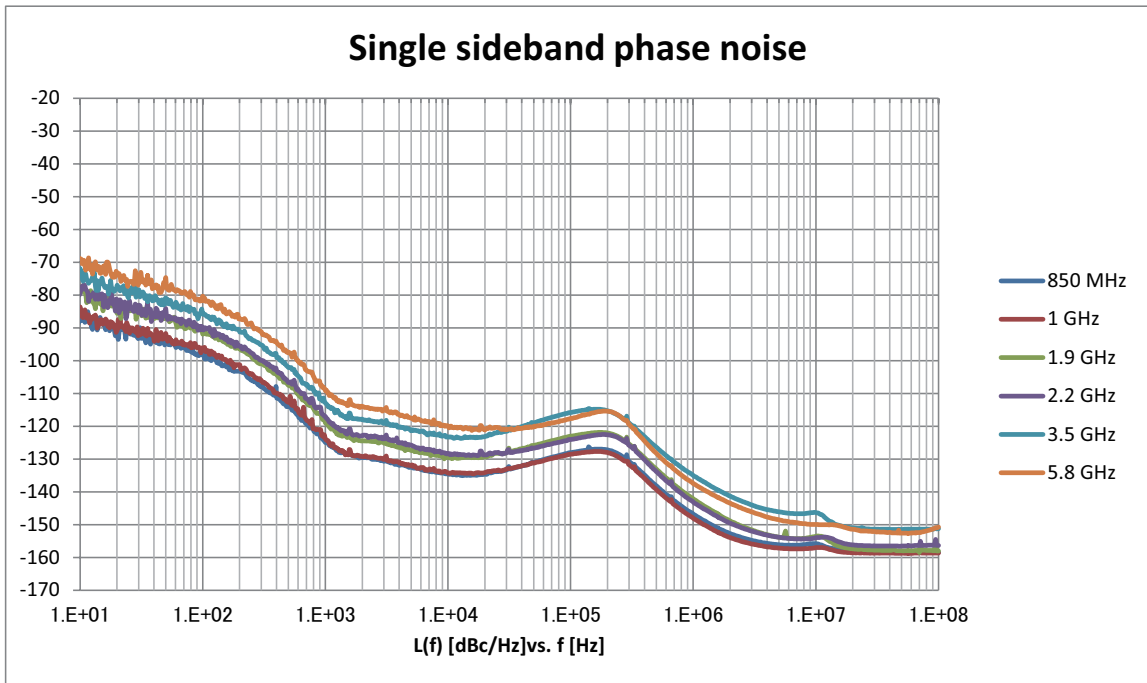
(meas)

■ 850 MHz, 1/1.9/2.2/3.5/5.8 GHz, CW, Optimize S/N: On, with MG3740A-002



Phase Noise Optimization: <200 kHz

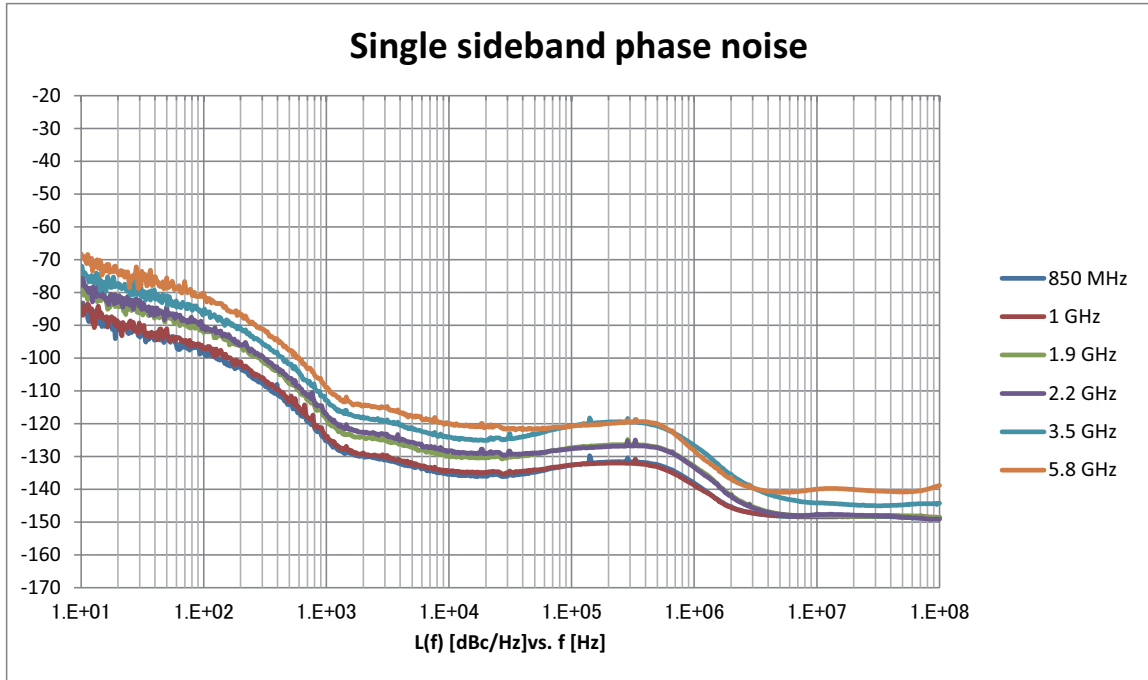
(meas)



Phase Noise Optimization: >300 kHz

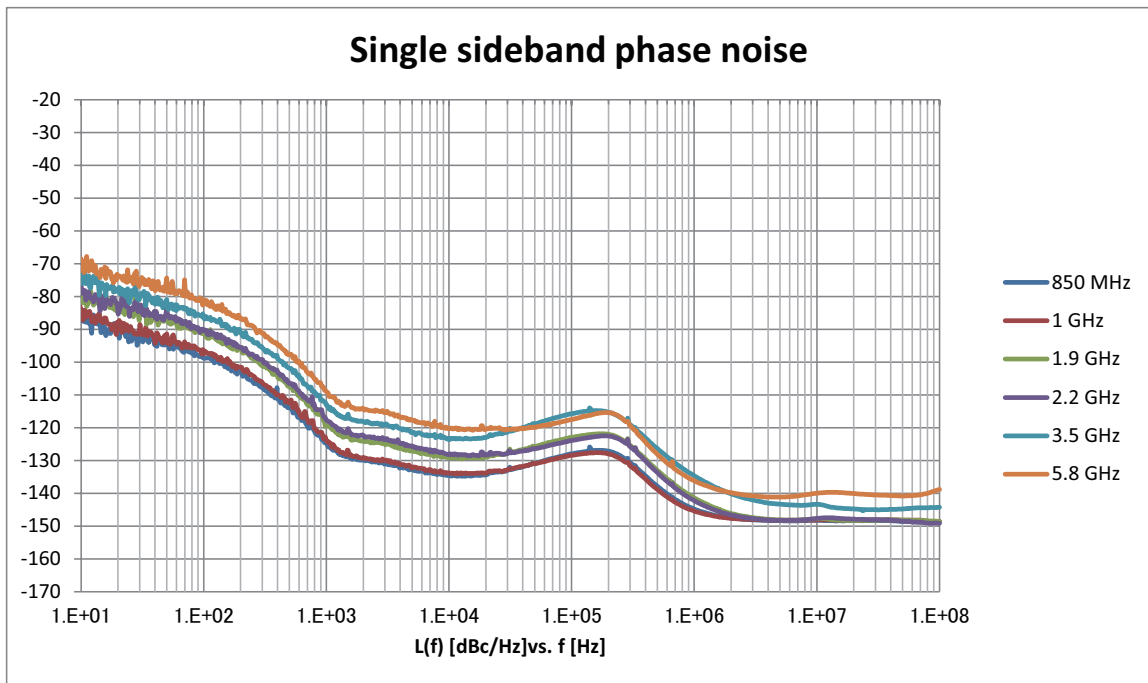
(meas)

■ 850 MHz, 1/1.9/2.2/3.5/5.8 GHz, Mod = On, with MG3740A-002



Phase Noise Optimization: <math><200</math> kHz

(meas)



Phase Noise Optimization: >300 kHz

(meas)

Analog Modulation

Optimize Function

Spurious Mode

Mode to control spurious problem. Controls spurious generated by the modulator.

Distortion Mode

Mode to control distortion problem. Optimizes the setting automatically to avoid distortions.
This mode can be used when the output frequency is 7 MHz or higher .

Amplitude Modulation (AM)

Internal modulation only; Specifications for modulated CW signal, Optimization mode: Distortion

AM Depth Type

Lin: Displays the AM depth type in linear.
Exp: Displays the AM depth type into the log format.

AM Depth

Range: 0 to 100%
Resolution: 0.1%

Peak Level: $\leq +4$ dBm, AM Depth Type: Lin, after CAL

AM Depth Error

$< 3\%$ of setting + 2% (nom.) ($100 \text{ kHz} \leq f < 98 \text{ MHz}$, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: $\leq 90\%$)
 $< 2\%$ of setting + 1% (nom.) ($98 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: $< 20\%$)
 $< 2\%$ of setting + 1% ($98 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$, Modulation Rate: 1 kHz, AM Source: Sine, $20\% \leq \text{AM Depth m} \leq 90\%$)

Distortion

$< 2\%$ (nom.) ($100 \text{ kHz} \leq f < 7 \text{ MHz}$, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 30%)
 $< 2.5\%$ (nom.) ($100 \text{ kHz} \leq f < 7 \text{ MHz}$, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 90%)
 $< 2\%$ ($7 \text{ MHz} \leq f < 98 \text{ MHz}$, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 30%)
 $< 2.5\%$ ($7 \text{ MHz} \leq f < 98 \text{ MHz}$, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 90%)
 $< 1\%$ ($98 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 30%)
 $< 1\%$ ($98 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$, Modulation Rate: 1 kHz, AM Source: Sine, AM Depth m: 90%)

Modulation Frequency Response

$100 \text{ kHz} \leq f < 98 \text{ MHz}$, ± 1.5 dB Bandwidth

Modulation Ratio m: 30%
 $0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)
Modulation Ratio m: 90%
 $0.1 \text{ Hz} \leq \text{Modulation Rate} \leq 20 \text{ kHz}$ (nom.)

$98 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$, ± 1 dB Bandwidth

Modulation Ratio m: 30%
 $0.1 \text{ Hz} \leq \text{Modulation Rate} < 50 \text{ Hz}$ (nom.), $50 \text{ Hz} \leq \text{Modulation Rate} \leq 100 \text{ kHz}$ (typ.)
Modulation Ratio m: 90%
 $0.1 \text{ Hz} \leq \text{Modulation Rate} < 50 \text{ Hz}$ (nom.), $50 \text{ Hz} \leq \text{Modulation Rate} \leq 100 \text{ kHz}$ (typ.)

Frequency Modulation (FM)

Internal modulation only; Specifications for modulated CW signal, Optimization mode: Distortion

FM Deviation

Range: 0 Hz to 40 MHz, or [50 MHz – Modulation Rate] (smaller value)
Resolution: 0.1 Hz

Output Level: $\leq +4$ dBm, after CAL

Deviation Accuracy

$< 2\%$ of setting + 20 Hz (nom.) (Modulation Rate: 1 kHz, FM Source: Sine,
 $100 \text{ kHz} + 2 \times (\text{Modulation Rate} + 2 \times \text{FM Deviation}) \leq f \leq 2.7 \text{ GHz}$, $20 \text{ Hz} \leq \text{FM Deviation} \leq 200 \text{ Hz}$)
 $< 3\%$ of setting + 20 Hz, $< 1.26\%$ of setting + 20 Hz (typ.) (Modulation Rate: 1 kHz, FM Source: Sine, $250 \text{ kHz} + 2 \times$
(Modulation Rate + $2 \times \text{FM Deviation}) \leq f \leq 2.7 \text{ GHz}$, $200 \text{ Hz} \leq \text{FM Deviation} \leq 40 \text{ kHz}$, (Deviation + modulation rate) > 0.2)
 $< 3\%$ of setting + 20 Hz, $< 1.84\%$ of setting + 20 Hz (typ.) (Modulation Rate: 1 kHz, FM Source: Sine, $250 \text{ kHz} + 2 \times$
(Modulation Rate + $2 \times \text{FM Deviation}) \leq f \leq 2.7 \text{ GHz}$, $200 \text{ Hz} \leq \text{FM Deviation} \leq 40 \text{ kHz}$, (Deviation + modulation rate) > 1.2)

Distortion

- <0.5% (nom.) (Modulation Rate: 1 kHz, FM Source: Sine, $100 \text{ kHz} + 2 \times (\text{Modulation Rate} + 2 \times \text{FM Deviation}) \leq f < 1 \text{ MHz}$, FM Deviation: 22.5 kHz)
- <0.4% (Modulation Rate: 1 kHz, FM Source: Sine, $1 \text{ MHz} + 2 \times (\text{Modulation Rate} + 2 \times \text{FM Deviation}) \leq f \leq 2.7 \text{ GHz}$, FM Deviation: 22.5 kHz)
- <1% (nom.) (Modulation Rate: 1 kHz, FM Source: Sine, $100 \text{ kHz} + 2 \times (\text{Modulation Rate} + 2 \times \text{FM Deviation}) \leq f < 1 \text{ MHz}$, FM Deviation: 3.5 kHz)
- <0.5% (Modulation Rate: 1 kHz, FM Source: Sine, $1 \text{ MHz} + 2 \times (\text{Modulation Rate} + 2 \times \text{FM Deviation}) \leq f \leq 2.7 \text{ GHz}$, FM Deviation: 3.5 kHz)

Modulation Frequency Response

- $100 \text{ kHz} + 2 \times (\text{Modulation Rate} + 2 \times \text{FM Deviation}) \leq f < 10 \text{ MHz}$, Deviation: 40 kHz, $\pm 1 \text{ dB}$ Bandwidth
20 Hz \leq Modulation Rate \leq 20 kHz (nom.)
- $10 \text{ MHz} \leq f \leq 2.7 \text{ GHz}$, Deviation: 40 kHz, $\pm 1 \text{ dB}$ Bandwidth
20 Hz \leq Modulation Rate \leq 20 kHz (nom.)

Phase Modulation (PM)

Internal modulation only; Specifications for modulated CW signal, Optimization mode: Distortion

PM Deviation

- Range: 0 rad. to 160 rad., or $[40 \text{ MHz} \div \text{Modulation Rate}]$ (smaller value)
- Resolution: 0.001 rad.

Output Level: $\leq +4 \text{ dBm}$, $100 \text{ kHz} + 2 \times (\text{Modulation Rate} + 2 \times \text{PM Deviation} \times \text{Modulation Rate}) \leq f \leq 2.7 \text{ GHz}$, after CAL

Deviation Accuracy

- <2% of setting + 0.02 rad. (nom.) (Modulation Rate: 1 kHz, ΦM Source: Sine, 0 rad. < PM Deviation: $\leq 0.7 \text{ rad.}$)
- <3% of setting + 0.02 rad., <1.84% of setting + 0.02 rad. (typ.) (Modulation Rate: 1 kHz, ΦM Source: Sine, 0.7 rad. < PM Deviation: $\leq 20 \text{ rad.}$)

Distortion

- <0.2% (typ.) (Modulation Rate: 1 kHz, ΦM Source: Sine, PM Deviation: 20 rad.)

Modulation Frequency Response

- Deviation: 2 rad., $\pm 1 \text{ dB}$ Bandwidth
- 20 Hz \leq Modulation Rate \leq 20 kHz (nom.)

Pulse Modulation

On/Off Ratio

- >70 dB ($50 \text{ MHz} \leq f \leq 3 \text{ GHz}$)
- >60 dB ($3 \text{ GHz} < f \leq 6 \text{ GHz}$)

Minimum Pulse width

- 1 μs (nom.)

Rise/Fall Time

- $\leq 50 \text{ ns}$ (10 to 90%) (nom.)

Pulse Repetition Frequency

- DC to 1 MHz (Duty: 50%)

External Pulse Modulation Input

- AUX Connector (Rear panel), TTL
- H: RF On, L: RF Off

Internal Modulation Signal

Waveform

- Sine wave, Triangular wave, Square wave, Ramp wave (Positive or Negative)

Modulation Rate

- Sine wave: 0.01 Hz to 40 MHz or (50 MHz – FM Deviation)
- Triangular wave, Square wave, Ramp wave: 0.01 Hz to 4 MHz or (5 MHz – FM Deviation)

Frequency Resolution

- 0.1 Hz

Phase

- 180 deg to 180 deg

Phase Resolution

- 0.1 deg

Additional Analog Modulation Input

When MG3740A-050/080 is installed and for 1st SG and 2nd SG respectively

Internal modulation only; Specifications for modulated CW signal, Optimization mode: Distortion

Modulation Type

AM, FM, Φ M

Input Impedance

50 Ω /600 Ω /Hi-Z (100 k Ω /70 pF) (nom.)

Coupling

DC or AC is alternatively selectable.

Input Level

For set value, 2 V_{p-p} (nom.)

Input Frequency

DC Coupling: DC to 1 MHz (nom.)

AC Coupling: 20 Hz (typ.) to 1 MHz (nom.)

Simultaneous Modulation

AM + FM

AM + Φ M

Internal 1 + Internal 2

Internal + External

FM and Φ M cannot be enabled simultaneously.

Modulation Frequency Response (AM)

Peak Level: $\leq +4$ dBm, 100 kHz $\leq f < 98$ MHz, AM Depth Type: Lin, ± 1.5 dB Bandwidth, after CAL

Depth m: 30%

DC Coupling: DC \leq Modulation Rate ≤ 20 kHz (nom.)

AC Coupling: 20 Hz \leq Modulation Rate ≤ 20 kHz (nom.)

Depth m: 90%

DC Coupling: DC \leq Modulation Rate ≤ 20 kHz (nom.)

AC Coupling: 20 Hz \leq Modulation Rate ≤ 20 kHz (nom.)

Peak Level: $\leq +4$ dBm, 98 MHz $\leq f \leq 2.7$ GHz, AM Depth Type: Lin, ± 1 dB Bandwidth, after CAL

Depth m: 30%

DC Coupling: DC \leq Modulation Rate < 50 Hz (nom.)

50 Hz \leq Modulation Rate ≤ 100 kHz (typ.)

AC Coupling: 20 Hz \leq Modulation Rate < 50 Hz (nom.)

50 Hz \leq Modulation Rate ≤ 100 kHz (typ.)

Depth m: 90%

DC Coupling: DC \leq Modulation Rate < 50 Hz (nom.)

50 Hz \leq Modulation Rate ≤ 100 kHz (typ.)

AC Coupling: 20 Hz \leq Modulation Rate < 50 Hz (nom.)

50 Hz \leq Modulation Rate ≤ 100 kHz (typ.)

Modulation Frequency Response (FM)

Output Level: $\leq +4$ dBm, 100 kHz + 2 \times (Modulation Rate + 2 \times FM Deviation) $\leq f \leq 10$ MHz, FM Deviation: 40 kHz, ± 1 dB Bandwidth, after CAL

DC Coupling: DC \leq Modulation Rate ≤ 20 kHz (nom.)

AC Coupling: 20 Hz \leq Modulation Rate ≤ 20 kHz (nom.)

Output Level: $\leq +4$ dBm, 10 MHz $\leq f \leq 10$ MHz, FM Deviation: 40 kHz, ± 1 dB Bandwidth, after CAL

DC Coupling: DC \leq Modulation Rate < 50 Hz (nom.)

50 Hz \leq Modulation Rate ≤ 200 kHz (typ.)

AC Coupling: 20 Hz \leq Modulation Rate < 50 Hz (nom.)

50 Hz \leq Modulation Rate ≤ 200 kHz (typ.)

Modulation Frequency Response (PM)

Output Level: $\leq +4$ dBm, 100 kHz + 2 \times (Modulation Rate + 2 \times PM Deviation \times Modulation Rate) $\leq f \leq 2.7$ GHz,

PM Deviation: 2 rad., ± 1 dB Bandwidth, after CAL

DC Coupling: DC \leq Modulation Rate < 200 Hz (nom.)

200 Hz \leq Modulation Rate ≤ 20 kHz (typ.)

AC Coupling: 20 Hz \leq Modulation Rate < 200 Hz (nom.)

200 Hz \leq Modulation Rate ≤ 20 kHz (typ.)

Carrier Leak

with MG3740A-020

(18° to 28°C, RMS Value: 0 dB, after CAL)

≤ -55 dBc (100 MHz $\leq f < 4$ GHz)

≤ -45 dBc ($f \geq 4$ GHz)

Image Rejection

with MG3740A-020
(18° to 28°C, RMS Value: 0 dB, Complex CW at 1 MHz or less, after CAL)
≤-50 dBc (200 MHz ≤ f < 4 GHz)
≤-43 dBc (f ≥ 4 GHz)

I and Q Input/Output

Baseband I/Q Adjustment

with MG3740A-020

DC Offset

Range: -20.000% to +20.000%
Resolution: 0.025%

Gain Balance

(Gain adjustment of I-phase for Q-phase)
Range: -1.000 dB to +1.000 dB
Resolution: 0.001 dB

Quadrature Adjustment

Range: -10.00 deg. to +10.00 deg.
Resolution: 0.01 deg.

Phase Adjustment

Range: -360.00 deg. to +360.00 deg.
Resolution: 0.01 deg.

Skew Adjustment

Range: -800.000 ns to +800.000 ns
Resolution: 1 ps

Delay Adjustment

Range: -400.000 ns to +400.000 ns
Resolution: 1 ps

Arbitrary Waveform Generator

with MG3740A-020

Waveform Resolution

14, 15, 16 bits for each I/Q

Modulation Bandwidth

2 MHz
(When Over sampling rate = 4. The maximum number of Sampling rate = 8 MHz)

Reconstruction Filter

80 MHz

Baseband Level Adjustment (RMS Value Tuning)

Adjustable Input Level to Quadrature Modulator
Decrease level: Decreases distortion
Increase level: Improves noise floor
Variable Range: ±8 dB
Resolution: 0.01 dB

Marker Output

Waveform Resolution
14 bits: Waveform Pattern: 3 signals, or Internal Generated: 3 signals
15 bits: Waveform Pattern: 1 signal, or Internal Generated: 3 signals
16 bits: Internal Generated: 3 signals
Supports switching Positive/Negative logic pulse outputs

Internal Baseband Reference Clock

Range: 20 kHz to 200 MHz
Resolution: 0.001 Hz

Waveform Memory

1stRF

When MG3740A-048 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.

- without MG3740A-045
 - 64 Msamples
- with MG3740A-045
 - 256 Msamples

2ndRF

When MG3740A-078 is installed, both memory A and memory B must have the same capacity. A combination of different capacities is not available.

- without MG3740A-075
 - 64 Msamples
- with MG3740A-075
 - 256 Msamples

Number of loadable files

The following numbers of waveform patterns are available per waveform memory:

Max. Package Count: 4096

Max. Patterns per Package: 4096

The maximum number of patterns in total: 4096/waveform memory

The minimum number of samples per pattern: 128

Combination of Baseband Signal Function

1st VSG: with MG3740A-048

This function synthesizes the signals of two memories to generate a baseband waveform.

2nd VSG: with MG3740A-078

This function synthesizes the signals of two memories to generate a baseband waveform.

Frequency Offset

$\pm (8 \text{ MHz} \times 0.8 - \text{waveform data bandwidth}) \div 2$ (max.)

Sequences Function

Selecting combination file supports following functions:

- Pattern switching method (manual, auto)
- Pattern switching position (frame end, pattern end)
- External trigger signal switches pattern at manual pattern switching
- Sequence restart function
- Maximum element: 200
- Lowest number of point by pattern: 1000

Level Ratio Setting Range: Two signal level ratio <80 dB or Off

Level Setting Resolution: 0.01 dB

Frequency Offset

Frequency Setting Resolution: 1 Hz

Pattern Trigger

External trigger switches pattern when using waveform pattern for sequence

Input Connector

Connector: Either of BNC-J connector (Start Frame TRIG Input, Pattern TRIG1 Input) or AUX connector can be used

Input Level: TTL

Logic: Select Rise/Fall Polarity

Trigger Input

Function: Synchronizes with trigger signals and starts waveform pattern output; Switches start Trigger/Frame trigger

Start Trigger

Starts waveform output

Frame Trigger

Outputs signals at burst timing

Outputs data for burst length at frame trigger timing and waits for next frame trigger

Trigger Event

The following trigger events can be detected

No Retrigger, Buffered Trigger, Restart on Trigger

Input Connector

Function switching: Start trigger or frame trigger can be selected

Connector: Either of BNC-J connector (Start Frame TRIG Input, Pattern TRIG1 Input) or AUX connector can be used

Input Level: TTL

Logic: Select Rise/Fall Polarity

Sweep/List Function

Sweep Function

Function: Sets frequency and level sweep at 1000-point resolution

List Function

Function: Sets sweep points for both frequency and level individually to 500 points

BER Measurement Function

with MG3740A-021

Connector

Connector: AUX Connector (Rear panel)
Level: TTL

Input Signal

Data, Clock, Enable

Input Bit Rate

100 bps to 40 Mbps

Measurable Pattern

Repeat PN9, PN11, PN15, PN20, PN23, ALL0, ALL1, 01
PN9fix, PN11fix, PN15fix, PN20fix, PN23fix, User Define

Synchronization Establishing Condition

PN Signal: PN order × 2-bit error free
PNfix Signal: Syncs with PN signal at PN order × 2-bit error free;
Syncs with Pnfix signal at PN order error free from Pnfix signal header bit
Repeat ALL0, ALL1, 01: 10-bit Error Free
UserDefine: 8-bit to 1024-bit (variable) error free;can select header bit for Sync detection

Re-synchronization Judgment

x/y
x: Number of error bits in y bit (Setting range: 1 to y/2)
y: Number of measurement bits (select from 500, 5000 and 50000)

Measurable Bit

$\leq 2^{32} - 1$ bit

Measurable Error Bit Count

$\leq 2^{32} - 1$ bit

Measurement End

Number of measurement bits, Number of measurement error bits

Automatic Re-synchronization

Can be toggled on and off

Re-synchronization

Count Clear, Count Keep

Measurement Mode

Single, Endless, Continuous

Display

Status, Error, Error Rate, Error Count, SyncLoss Count, Measurement Bit Number

Polarity Reversal Function

Supports polarity reversal for Data, Clock, Enable

Measured Result Reset Function

At BER measurement, hold sync status, clears measured value and measures from 0

Connector

External Reference Input

Connector: BNC-J (Rear panel), 50 Ω (nom.)
Frequency: 5, 10, 13 MHz
Operating Range: ± 1 ppm
Input Level: -15 dBm \leq Level \leq $+20$ dBm (AC coupled)

Reference Signal Output

Connector: BNC-J (Rear panel), 50 Ω (nom.)
Frequency: 10 MHz
Output Level: ≥ 0 dBm (AC coupled)

Sweep Output

with MG3740A-017
Connector: BNC-J (Rear panel), $< 1\Omega$ (Drive Capacity: 2 k Ω)
Output Level: 0 to 10 V (10 V Sweep Signal Function), 0/5 V (Sweep Status)

Additional Analog Modulation Input

When MG3740A-050/080 is installed:
Connector: Rear panel, BNC-J
Input Impedance: 50 Ω , 600 Ω , or Hi-Z (100 k Ω /70 pF) (nom.)
Input Level: For set value, 2 Vp-p (nom.), Absolute maximum ratings: ± 5 V

External Controller

Control from external controller (excluding power-on/off)
Ethernet (10/100/1000Base-T): RJ-45 (Rear panel)
GPIO: IEEE488 Bus connector (IEEE488.2, Rear panel)
Interface Function: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT0, C0, E2
USB (B): USB-B connector (USB2.0, Rear panel)

USB

Hard copies waveform to external device and saves main-frame basic parameters
USB-A connector (USB2.0, Front panel: 2 ports, Rear panel: 2 ports)

Monitor Output

Mini D-Sub connector (compatible with VGA, Rear panel)

AUX

50-pin (for DX10A-50S) (Rear panel)
Input/Output Level: TTL
with MG3740A-017/021: with AUX-BNC Conversion Cable

Display

8.4-inch, XGA-color LCD (Diagonal: 213 mm, Resolution: 1024 × 768)

General

Dimensions and Mass

426 (W) × 177 (H) × 390 (D) mm (excluding projections)
≤13.7 kg (MG3740A-032, 034, or 036, excluding other options)
≤17 kg (including all options)

Power Supply

Power Voltage: 100 V(ac) to 120 V(ac), 200 V(ac) to 240 V(ac)
Frequency: 50 Hz/60 Hz
Power Consumption: ≤350 VA (including all options)
180 VA (nom.)
(with MG3740A-032, 034, or 036, with MG3740A-041/042, excluding other options)
260 VA (nom.)
(with MG3740A-032, 034, or 036, with MG3740A-041/042, with MG3740A-062, 064, or 066,
with MG3740A-071/072, excluding other options)
280 VA (nom.)
(with MG3740A-032, 034, or 036, with MG3740A-041/042, with MG3740A-062, 064, or 066,
with MG3740A-071/072, with MG3740A-001/021, excluding other options)

Temperature Range

Operating: +5° to +45°C, Storage: -20° to +60°C

EMC

EN61326-1, EN61000-3-2

LVD

EN61010-1

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